

Área 12: Economia Social e Demografia Econômica  
**PRESCHOOL EDUCATION AND INTRA-HOUSEHOLD BARGAINING POWER<sup>1</sup>**

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**Abstract:**

This paper aims to identify the preschool's effect on the children's bargaining power in family decision-making. To do so, we exploit the educational reform caused by the Brazilian Constitutional Amendment N° 59 of 2009 and the CNE/CEB Resolution N° 2/2016, which makes preschool attendance mandatory from 4 years old onwards. We drew our analysis sample from the POF 2017-2018. Due to the characteristics of the data, the identification strategy we used was a randomization-based RDD approach. We found evidence that the preschool frequency may affect the children's bargaining power in family decision-making. Results show that preschool improves the children's bargaining power in the family decision-making process by approximately 0.22 and 0.29 standard deviation in purchasing products of interest to children. We infer, therefore, that preschool attendance affects children's role in family decision-making by improved human capital. Furthermore, we corroborated that the children should indeed be considered in household demand analysis.

**Keywords:** Preschool; human capital; the family decision-making process; bargaining power; Randomization-based RDD approach.

**Resumo:**

Este trabalho busca identificar os efeitos da pré-escola sobre o papel das crianças nas tomadas de decisões familiares. Para identificar o efeito de interesse, foi explorada a reforma educacional proposta pela Emenda Constitucional N° 59 de 2009 e pela Resolução da CNE/CEB n° 2/2016. Estas tornam obrigatória a frequência das crianças na pré-escola, a partir dos 4 anos. Os dados utilizados nesta pesquisa provêm da POF 2017/2018. Considerando as características dos dados disponíveis, utilizou-se como estratégia de identificação a abordagem de regressões descontínuas (RDD), sob o pressuposto de randomização. Encontrou-se evidências de que a frequência pré-escolar pode afetar o poder de barganha das crianças na tomada de decisões familiares em, aproximadamente, 0,22 e 0,29 desvio-padrão na compra de produtos de interesses para elas. Portanto, os resultados indicam que as crianças desempenham um papel ativo na tomada de decisões domésticas, reforçado pelo investimento em capital humano na primeira infância. Dessa forma, se evidencia que crianças e adolescentes devem ser considerados na análise da demanda doméstica.

**Palavras-chave:** Pré-escola; capital humano; processo decisório familiar; poder de barganha; RDD baseada no pressuposto de randomização.

**Código JEL:** D04, D12, I2, J10

## 1 Introduction

Empirical literature that investigates the effects of early childhood education has focused on outcomes related to education, the stock of health, and the future wages of individuals, given that these outcomes are affected directly by boosting the process of accumulating cognitive and noncognitive skills (Berlinski et al., 2009; Borghans et al., 2008; Cunha et al., 2010; Cunha & Heckman, 2008; García & Heckman, 2021; J. Heckman et al., 2013; J. J. Heckman, 2008). However, the improvement of human capital accumulation may affect outcomes beyond those already studied, such as the intra-household behavior of children, especially related to their participation in the household decision-making process.

In economics analyses, children are seldom recognized as economic agents able to actively influence the family consumption decision (Chavda et al., 2005; Dauphin et al., 2011; Lundberg et al., 2009). The

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traditional theoretical economic models that study intra-household behavior, both the unitary and collective models, treat children as mere passive bystanders or as public goods belonging to parents' utility functions (Becker, 1974; Browning et al., 2013). It means that the child's consumption behavior is modeled only as a reflection of the parents' consumption behavior due to a consumption socialization process, according to Chavda et al. (2005). Therefore, in studies about the family decision process, the children are usually not considered decision-makers.

However, as children grow up, they acquire characteristics of economic agents that allow them to make sole decision-making and shared decision-making with parents about consumption and even become decision-makers in the household decision-making process (Dauphin et al., 2011; Harbaugh et al., 2001, 2003; Lundberg et al., 2009; Sutter et al., 2019; Valkenburg & Cantor, 2001). Under the theoretical framework of the collective model, Dauphin et al. (2011) state that families with children have at least three decision-makers. Even though the authors do not explain how the children influence the family's decision-making process, they provide evidence about the children's active role in this process.

Dauphin et al. (2011) further emphasize that analyzing the family's decision-making process without incorporating the children in this process leads to misunderstanding some intra-household relations between members. The authors underline three reasons for that. First, the theoretical model can fail to explain economic issues concerning the investment in education, labor supply, and resource allocation in a low-income family. As the age of children increases, the decision to invest in their education ceases to be made entirely by the parents and becomes an individual decision (Akresh et al., 2012). Second, we can obtain an inaccurate analysis of family welfare. For example, the time and resources allocation in the family, such as the time allocation between study and leisure time of children, might be affected by the negotiation abilities of children or adolescents (Lundberg et al., 2009). Finally, analyzing the household demand system that disregards children as decision-makers might obtain biased estimates.

Therefore, when studying family decision-making, it becomes necessary to consider that children can acquire an active role in this process (Dauphin et al., 2011; Lundberg et al., 2009; Valkenburg & Cantor, 2001). Children's participation in family decision-making implies that they can decide under rationality assumptions and have bargaining skills. Studies realized by Harbaugh et al. (2001), Harbaugh et al. (2003), and Sutter et al. (2019) showed that as children grow up, they begin to decide in line with the economic assumptions; due to that, their choices exhibit rational behavior close to the adults' behavior.

Harbaugh et al. (2003) further showed that children between the ages of 7 and 18 exhibit strategy behavior when making decisions with their parents or peers. Individuals came across several bargaining situations during their childhood and teenage years. The payoffs obtained from this situation are either simple (daily consumption of candy, breakfast products, and snacks) or complex and essential to parents and children (Chavda et al., 2005; Harbaugh et al., 2003; Valkenburg & Cantor, 2001). As for the latter, parents and children can decide where to spend their vacations, which toy to buy, or decide which university the children will study at.

Previous research has established that children's negotiation behavior depends on their age, gender, family income, time parents dedicate to them, and acquired skills (Chavda et al., 2005; Harbaugh et al., 2003; Lundberg et al., 2009; Sutter et al., 2019). Although these factors affect the children's influence on the family decision, in this paper, we focus on understanding how the improvement of accumulation skills can become the children in active decision-makers in the household.

The children's stock of cognitive and noncognitive skills can influence the family decision-making process. These skills determine the strategy adopted by the children in the bargaining process. While teenagers use persuasion, argumentation, and emotional strategies, young children usually make direct requests to their parents (Chavda et al., 2005; Palan & Wilkes, 1997; Valkenburg & Cantor, 2001).

Cognitive skills linked to reading provide the children with the main element for the negotiation process, communicative skills. Moreover, even though it does not have an obvious mechanism, the skills measured by mathematics score also affect children's bargaining process (Lundberg et al., 2009). It is worth

remembering that scores from proficiency tests capture cognitive and noncognitive skills (Balart et al., 2018; Borghans et al., 2008, 2016; Hanushek, 2013). Thus, the score Lundberg et al. (2009) used to analyze the bargaining process also captures children's noncognitive skills. These skills relate to children's behavior in and out of the home (Berlinski et al., 2009). It implies that noncognitive skills can influence the negotiation with the parents, given that good behavior is a child's bargaining process strategy (Lundberg et al., 2009).

As mentioned above, beyond the children's age and family characteristics, the stock of skills plays a relevant role in children's ability to influence the family decision-making process. In this sense, in addition to analyzing the children as a decision-maker (Dauphin et al., 2011), we need to study the process by which they acquire power in the household decision, mainly linked to the role of accumulation of human capital in this process, a gap not explored by the literature yet.

The formation and improvement of cognitive and noncognitive skills is a process that happens throughout individuals' lives. However, it is in early childhood that the foundation of brain architecture is established, and the individual is more open to both positive and negative influences for skill development (Castro & Rolleston, 2018; Cunha & Heckman, 2008; J. Heckman et al., 2013; Center on the Developing Child, 2016). Therefore, any early childhood intervention impacts the stock of cognitive and noncognitive skills. The results of early childhood interventions, such as preschool, on skill development are well documented in several papers (Berlinski et al., 2009; Camilli et al., 2010; Cunha & Heckman, 2008; Felício et al., 2012; García et al., 2018; Pinto et al., 2017).

By conditioning the bargaining power of children to the acquisition of skills, it seems reasonable to infer that the degree of intra-household influence of the children can be affected by human capital accumulation. Therefore, this paper focuses on answering the following questions: Do the skills obtained during early childhood through preschool affect the bargaining power of children in family decision-making?

Studying the process of children acquiring bargaining power in the household and the role of the intervention like the preschool can help understand the development of individuals' consumption behavior. With that, one might predict the behaviors of these children in the economic environment when they become adults, given that bargaining is a fundamental element of the economic world, especially when considering resource constraints (Harbaugh et al., 2003). Moreover, identifying preschool's effect on households' decision-making process provides policymakers with another indicator of the effectiveness of early childhood interventions. Therefore, the evidence we will find can justify the existing and future interventions (improving the quality of early childhood education) in individuals' lives.

In order to answer our question of interest, this paper suggests two outcomes to measure children's influence or bargaining power over family decision-making. We construct our outcomes measures using the ratio of children's spending on their good interests to family income. Even though the children can influence a decision about the consumption of several products such as candy, toys, types of cereal, movies, and types of restaurants that the families frequent (Flurry & Burns, 2005; Labrecque & Ricard, 2001), we analyze the bargaining power only on the consumption of toys, electronic items, and some leisure items. When families buy these products, children are expert individuals and holders of greater information used in the bargaining process (Flurry & Burns, 2005; Laura A Flurry, 2007).

The SPC Brazil survey, through the Meu bolso Feliz program, found that children have a greater degree of influence when buying toys, games, and electronic items. The report revealed that the degree of influence of children in the purchase of toy and games are 7.06; the index used to measure the degree of influence varies from 1 to 10. For the electronics category, teenagers have a bigger influence than children when purchasing these items, 6.71 and 4.78, respectively (SPC, 2015).

This paper exploits the educational reform caused by the Brazilian Constitutional Amendment N° 59 of 2009 (BRASIL, 2009) and the CNE/CEB Resolution N° 2/2016 to identify the effect of the interest. This reform has become compulsory since 2009 to enroll children who turn years old before March 31 in

preschool (BRASIL, 2009, 2018). Therefore, the children's exposure to compulsory preschool is determined by the date of birth. It implies that children born after 2006 were affected by the educational reform; thus, they are a sample of analyses. This characteristic allows applying the RDD approach. The data used in this article come from the Family Budgets Survey (POF) 2017/2018, henceforth POF.

The data limitation does not allow us to identify the preschool effect on children's bargaining power. However, we identify the preschool's intention to treat on-treated (ITT) given the data settings. Our results show early evidence that a child's preschool attendance affects his bargaining power. We found that preschool improves the children's bargaining power in the family decision-making process by approximately 0.22 S.D. and 0.29 S.D. Given that we identify the ITT, this effect is a minimum effect of the preschool on children's bargaining power intra-household. Therefore, we may infer that preschool attendance can provide an active role for children in the family decision-making process.

We structured the remainder of the article as follows. First, we present the mechanism by which the preschool might affect the children's influence in family decision-making. Section 3 describes the data source and outlines the empirical strategy used to identify the intention to treat on-treated. Finally, we present the main results and discussion in section 4 and final remarks in section 5.

## **2 Theoretical framework**

Empirical literature generally uses either the collective or unitary model to analyze intra-household behavior. For example, the unitary model assumes that households maximize a single utility function subject to the family income. On the other hand, the collective model assumes that household members have an individual utility function. Given a decision-making process, they maximize the weighted sum of the utilities subject to budget constraints and household production. In the latter model, children are entered as part of parents' utility or as decision-makers (Browning et al., 2013)

However, even if the collective model allows us to know how many decision-makers there are in the household, it is not informative enough about the family decision-making process (Dauphin et al., 2011). The model only assumes that family decision-making leads to the Pareto efficient outcomes without specifying the process (Browning et al., 2013; Dauphin et al., 2011). This assumption does not allow the model to provide information about how the child can influence the family decision-making process and what factors influence this process.

Therefore, to explore and analyze our results, this section will present the mechanism by which early childhood education might affect the process of children's acquisition of bargaining power in the family environment. Studies developed by the Center on the Developing Child at Harvard University, Cunha and Heckman (2007, 2008), Cunha, Heckman, and Schenach (2010), and Heckman, Pinto, and Savelyev (2013) explain the technology of human capital production and how it occurs throughout the entire life of individuals. All these papers stated that production technology is composed of stages linked together and that the first stage of the process is relevant for the best accumulation of human capital during the life of individuals. Thus, given that each stage represents a different stage in life, early childhood acquires a leading role in the process of human capital accumulation (Cunha et al., 2010; Cunha & Heckman, 2007). Hence, early childhood interventions, such as preschool, affect cognitive and noncognitive skills accumulation.

The stock of skills determines the children's negotiation strategies in family decision-making (Lundberg et al., 2009). The relationship between these skills and early childhood education has already been documented in the international and national literature, using proficiency test scores as the outcomes variables (Berlinski et al., 2009; Camilli et al., 2010; Curi & Menezes-Filho, 2009; Pinto et al., 2017). Beyond measuring the cognitive skills, the proficiency test score also shows the behavior-related skills that are part of noncognitive skills (Balart et al., 2018; Borghans et al., 2011, 2016; J. Heckman et al., 2013).

Henceforth, given that early childhood education affects skills accumulation, it can also affect the bargaining power of children in the family decision-making process. First, it allows children and adolescents to develop communicative skills essential in negotiating between parents and children. Second,

it can affect their behavior within the household, which can be used as a bargaining element when negotiations with their parents (Lundberg et al., 2009). Therefore, it is plausible to think that early childhood education can also influence the decision-making process of children in the household, especially those related to the consumption of products of interest (Chavda et al., 2005; Dauphin et al., 2011; Sutter et al., 2019).

### 3 Empirical framework

This section details the empirical strategy used to study our relationship of interest. In the following subsections, we discuss how we coped with the issue regarding the unavailable there is no longitudinal data in Brazil. What is more, we describe the strategy adopted to address the endogeneity issue.

#### 3.1 Database

In this investigation, we use microdata from a Brazilian household budget survey, called POF, for the biennium 2017-2018 to apply the empirical strategy proposed in the following subsection. This survey is carried out by the Brazilian Institute of Geography and Statistics (IBGE) and contains information regarding consumption, spending, income, and Brazilian families' socioeconomic characteristics. It allows thus assess the profile of household consumption and intra-household resource allocation.

We focus on children born after 2006 because they can expose to preschool reform. We detail this reform in the next section. We restrict our sample to children older than nine years because the POF data contains information about individual consumption for individuals aged ten years or older. For these children, we obtained their birth date, the individual consumption of products of interest for them, family income, and other household socioeconomic characteristics. The products of interest for children are described in appendix A III.

Table 1 shows the characteristics and the size of our sample. Note in Table 1 that there are 1791 children in our sample. They were exposed to preschool reform. In the sample, there are 556 children who were born before March 31 and 1235 children born after this date. We observe that, on average, the children in the sample are ten years old, regardless of whether they were born before or after March 31. 52.3% of individuals are female.

In addition to information about the parents, we show the family income and the consumption expenditure of the household members in Table 1. For example, on average, the family income is approximately R\$ 4454.8 for the whole sample. When we stratified by date of birth, it observes that the family income is higher in families of children born before March 31 than those born after this date. This difference between the groups was also observed in the available income per capita variable. The POF defines available income as the sum of monetary and non-monetary family income after deducting taxes, social contributions, and other compulsory or quasi-compulsory deductions (IBGE, 2020).

In order to get an initial overview of family consumption expenditure, we report two variables in Table 1. The first one is the household individual consumption expenditure variables. We create this variable by summing the individual consumption expenditure of all household members. The average of this variable is R\$ 6457.59, and the difference between groups is R\$ 2806.7.

The second one is the children's consumption expenditure on products of their interest. Table 1 shows that children born before March 31 spend, on average, R\$ 146.58, while children born after this date spend R\$ 122.58. When we detail the expenditure on leisure, toys, and technology-related items, one observes that leisure and toys expenditures are higher in the first group. In contrast, the technology-related expenditure is higher in the second group.

Finally, at the bottom of Table 1, we show the average measure of the children's bargaining power in the household. We measure this power of bargaining in two different ways. First, we use the ratio between the expenditure on products of interest to children and the family income, which we called *bargaining1*. Second, measure 2, called *bargaining2*, is the ratio between the expenditure on products of interest to children and the available per capita income.

Table 1: Summary Statistics

Variable	Whole sample	Children born before March 31	Children after March 31
Gender (1=female)	0.523 (0.500)	0.545 (0.498)	0.513 (0.500)
Age	10.615 (0.735)	10.768 (0.800)	10.546 (0.694)
Mother's age	41.669 (12.092)	41.669 (12.581)	41.67 (11.867)
Father's age	43.709 (11.372)	43.368 (11.313)	43.866 (11.402)
Mother's schooling	9.005 (4.552)	9.031 (4.482)	8.993 (4.585)
Father's schooling	7.750 (4.616)	7.908 (4.562)	7.678 (4.641)
Family income	4454.798 (5199.432)	5027.149 (6589.296)	4197.123 (4412.801)
Available per capita income	1093.43 (1014.005)	1170.957 (1174.087)	1058.527 (931.437)
Household individual consumption expenditure*	6457.59 (23795.59)	8392.491 (39088.06)	5585.788 (11462.23)
Children's consumption expenditure	129.932 (257.056)	146.577 (272.297)	122.584 (250.317)
Leisure	19.256 (21.852)	24.64 (33.047)	16.433 (11.887)
Toys	108.752 (197.232)	156.639 (260.382)	93.222 (124.297)
TI	201.604 (339.838)	182.524 (260.382)	212.582 (379.363)
<b>Outcomes of interest</b>			
Bargaining1	0.006 (0.036)	0.006 (0.034)	0.006 (0.038)
Bargaining2	0.024 (0.138)	0.023 (0.122)	0.023 (0.147)
Observations	825	310	515

Note Standard deviation in parentheses. \* It is the sum of individual consumption expenditure of all household members.

Given the information presented, the difference observed in family and children expenditure and bargaining power cannot be attributed to the child attending preschool; household characteristics such as available income may be responsible for this differentiation. Therefore, we present our empirical strategy in the subsequent subsection to identify the effect of interest.

### 3.2 Identification strategy

Identifying the effect of preschool attendance on a child's bargaining power relies on the available data and identification strategy. In Brazil, we do not have information about of profile consumption of individuals and whether an individual attended preschool in the same survey. As a result, we do not allow the identification of the effect of preschool. However, due to the information on consumption and birth data

in the POF, we can exploit the educational reform caused by the Constitutional Amendment of 2009 to estimate preschool's intent-to-treat effects (ITT) on bargaining power.

The ITT is a concept commonly used under a randomization setting to deal with non-compliance, missing outcomes, and assignment deviations. In an ideal scenario and a randomization context, the individual who would be receiving the treatment is receiving it, and the one who should not be receiving it is in the control group. However, we do not always observe this ideal scenario. To overcome these issues, the ITT estimates the effect of the intervention exploits randomization assignment of groups - this creates balanced groups concerning observable characteristics like socioeconomic variables- and ignores the non-compliance and assignment deviation of the individuals. As a result, it obtains a conservative estimate of the effect of the intervention (Gupta, 2011; Mccoy, 2017).

This paper exploits the educational reform to define who should be in the treatment or control groups. The educational reform of the Brazilian basic education system caused by the constitutional Amendment of 2009 makes preschool enrollment mandatory starting at age 4 in Brazil. In addition, the enactment of Law N° 12.796 in 2013 reaffirmed the compulsory requirement of preschool enrollment. Together with CNE/CEB Resolution, these legal provisions determine the following eligibility rule that we exploit as exogenous variation: the children who turn four years old by March 31 of the current year must be enrolled in the preschool (BRASIL, 2009, 2013, 2018). This rule allows us to address the preschool variable's endogeneity, which comes from confounders regarding the parents' perception of the importance and return of education (Garces et al., 2002). Therefore, the discontinuity caused by the educational reform allows us to use the Regression Discontinuity Design (RDD). This design is the most rigorous strategy for causal inference in a non-experimental setting (Cattaneo et al., 2017, 2019).

The eligibility rule enforcement over the preschool enrollment is necessary to apply the RDD. It means that children's birth date determines the preschool attendance conditional at the threshold, which is March 31. In order to corroborate the effectiveness of the eligibility rule, we plot the relationship between the date of birth -henceforth score- and the preschool enrollment rate in Figure 1<sup>4</sup>. It observes that children born before March 31 are more likely to enroll in preschool than children born after this date. Finally, we present the eligibility rule enforcement before and after the educational reform in Appendix A I. and A II. to support the exogenous variation used in this study.

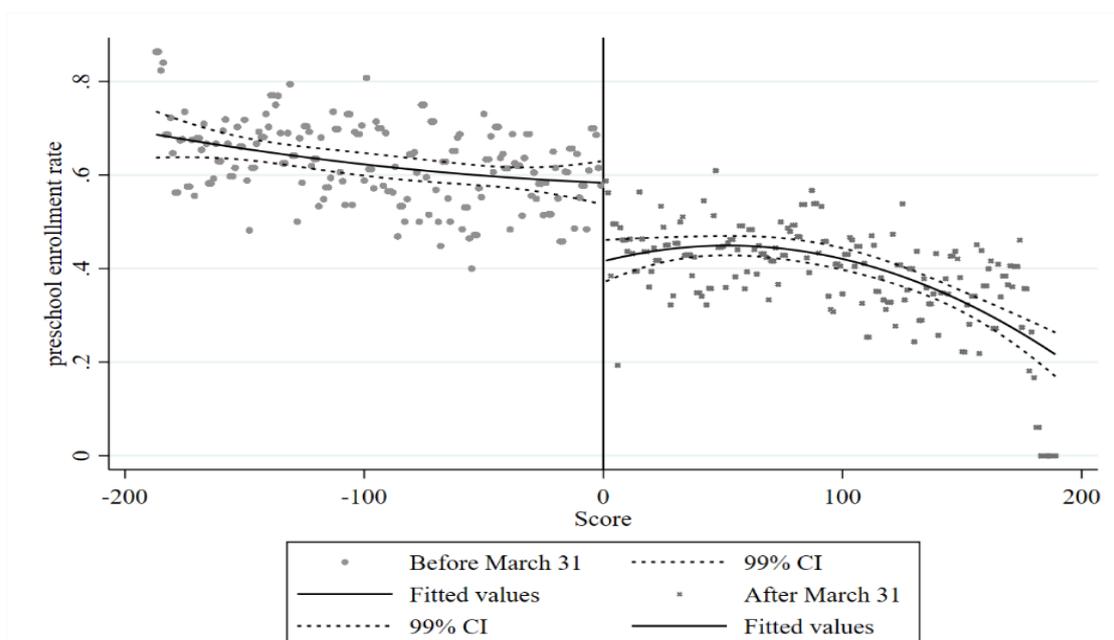


Figure 1: Effect of date of birth on the preschool enrollment rate in the period 2011-2015.

<sup>4</sup> The data used to elaborate this Figure come from to National Household Sample Survey (PNAD) carried out by IBGE.

Figure 1 also shows that compliance with preschool enrollment is imperfect. This setting, where compliance with treatment is imperfect, requires that we use the fuzzy RDD. However, the unavailability of data does not allow the employment of fuzzy RDD. Despite this, due to the effectiveness of the eligibility rule in determining preschool enrollment, we can still investigate the relation of interest under the Sharp RDD.

Indeed, we assume that the eligibility rule entirely determined the child's preschool attendance, and applying the RDD approach creates a setting similar to randomization. Therefore, we estimate the intention-to-treat of the preschool on the child's bargaining power in households. Likewise, Fitzpatrick (2010) and Guindon (2014) also use the concept of ITT to analyze other outcomes. Fitzpatrick (2010) studied the effect of the universal pre-K program on maternal labor supply, and Guindon (2014) investigated whether access to health insurance affects health services utilization and health outcomes. Consequently, we will provide evidence of the preschool effect on a child's bargaining power through the ITT parameter and some enlightenment on the role of a child in the family decision-making process.

In this paper, as mentioned above, we use the child's date of birth as the score variable and define the cutoff as March 31. In order to facilitate the applied the Sharp RDD, we reorganized our data and set March 31 as day zero; thus, the new cutoff value is zero henceforth. Thereby, the estimator to define the preschool effect is:

$$\tau_{W_0} = \frac{1}{N_{W_0}} \sum_{i \in \mathfrak{S}_0} (\tilde{y}_i(1) - \tilde{y}_i(0)) \quad (1)$$

In equation 1, the difference between the outcomes of children born before ( $\tilde{y}_i(1)$ ) or after ( $\tilde{y}_i(0)$ ) the cutoff date denotes the intention-to-treat effect of preschool. Note that this estimator differs from the standard RDD [see Calonico et al. (2014), Cattaneo et al. (2019), Hahn et al. (2001), and Imbens and Lemieux (2008) for more details about standard RDD setting]; It is because we adopt the framework developed by Cattaneo et al. (2015) called local randomization RDD. Even though the underlying idea is the same, this framework is conceptually different from the continuity-based framework (standard RDD) because its central assumption assumes that the assigned treatment status is random at a given window around the cutoff (Cattaneo et al., 2015, 2017).

We decide to apply the local randomization RDD framework to cope with the unavailability of data. We will analyze the preschool effect only in children exposed to educational reform. It means that our sample is composed of children born after 2006. This setting reduces the number of observations significantly in the sample. According to Cattaneo et al. (2017), the main advantage of this RDD approach is that it does not require a large sample. Thus, unlike the standard RDD, the framework allows us to employ randomization inference in an exact finite sample (Cattaneo et al., 2015, 2017). Therefore, the RDD under the randomization assumption is suited to address the few observations in the sample.

The procedure for implementation of the local randomization RDD framework requires, first of all, identifying a window where the identification assumptions hold. It means the window selected should ensure that preschool status (whether a child attended or not) can be understood as randomly assigned. To do so, we run a data-driven method recommended by Cattaneo et al. (2015), consisting of a balance test of predetermined or placebo covariates. The balance test fails to reject the zero treatment effect for covariates in the optimal window (Cattaneo et al., 2015, 2017).

In this framework adopted, we need to choose the randomization mechanism and a test statistic. We can adopt two different randomization mechanisms: Bernoulli and fixed margins randomization. However, Cattaneo et al. (2015) recommended the fixed-margins randomization by default. On the other hand, we use the Bernoulli trial as a validation and robustness check (Cattaneo et al., 2017).

After defining the window optimal and the randomization mechanism, we specify the test statistic to test the null hypothesis that preschool has no effect on children's bargaining influence inside the windows

selected. The test statistics we can use include the difference-in-means, the Kolmogorov-Smirnov test statistic, and the Wilcoxon rank-sum (Cattaneo et al., 2016, 2017). In this paper, the default test statistic will be the difference-in-means. We use the other test statistic as a robustness check to improve our estimates.

We choose the following covariates to select the optimal windows: region, gender, age, mother's schooling, father's schooling, family size, years of study, and available per capita income. We use the variable age because it affects the children's say in the household decision. It means that children and teenagers can adopt different strategies to influence parents' purchase of video games, cellphone, toys, and other items. John (1999) and Chavda et al. (2005) show some evidence that children's age defines the strategies children adopt in a negotiation process with their parents. Consequently, age is a variable that must be included in the balance test.

Family size also affects the bargaining power of children. For instance, a sibling in the household reduces the bargaining power of the children of interest because more family members reduce the resources available to each member. Additionally, we included as covariates the available per capita incomes. The family income also impacts children's bargaining. Low-income families, for example, prioritize the demand for food, housing, transportation, and health care. According to data from POF 2017/2018, 87 % of the total expenditure of families with an income of up to R\$ 1908 is done on food, housing, transportation, health care, education, clothing, and hygiene. It reduces the recourse available for expenses with the products analyzed in this paper. The opposite scenario can observe in families with higher income levels. These families spend only 59% of their income on food, housing, transportation, health care, education, clothing, and hygiene (IBGE, 2020). Thus, the available family income affects the influence of the children in the household decision.

The geographical location of the families also seems to be a factor that impacts their children's consumption and, consequently, their bargaining power. For example, the POF 2017/2018 shows that children from families living in another Brazil consume more than in the Northern region. On average, children's consumption expenditure on products of interest in the Northern region is R\$ 153.47, while in other regions, the average varies from R\$ 183.00 to R\$300.00 (IBGE, 2020).

In order to address the issue of gender bias (Adhvaryu & Nyshadham, 2016; Akresh et al., 2012), we use the gender variable in the balanced test. The parents' schooling is included to avoid issues concerning different levels of investment in children. Finally, we also use the children's years of study. This variable allows us to cope with school dropouts and failure.

As we explained above, we assume that the children cannot manipulate the date of birth. Thus, preschool attendance approximates a randomized experiment in a window closer to the cutoff. It implies that we conduct our analyses only in individuals with a date of birth in the window selected and exposed to education reform. Consequently, we obtain a local intention-treat effect of preschool on bargaining influence, which should be interpreted cautiously.

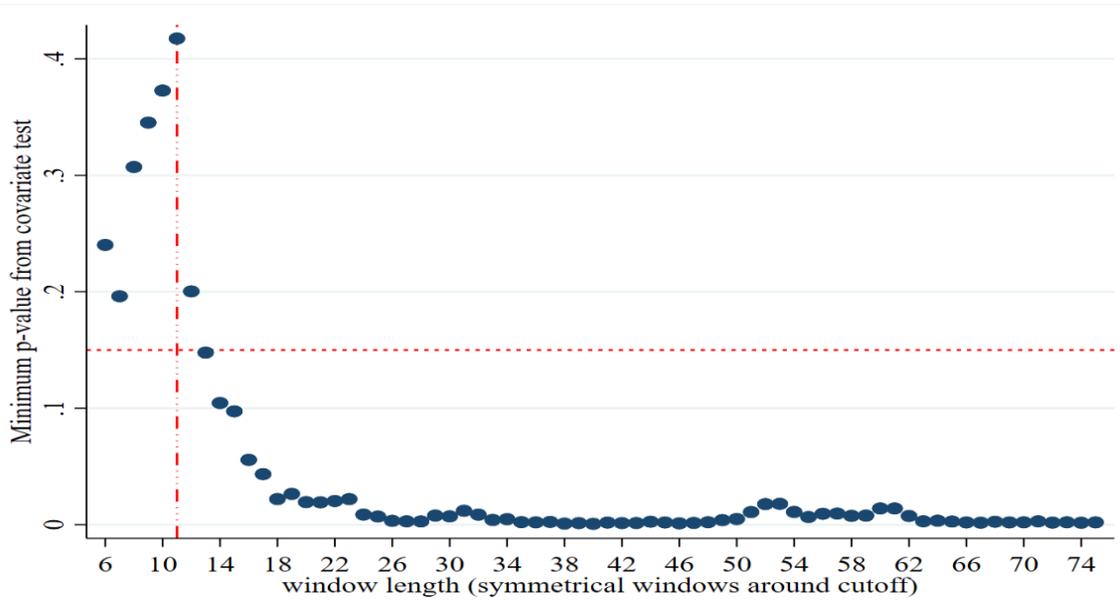
Finally, to complete this section, we show what the ITT captures in this investigation. Suppose the assumption of the local randomization is satisfied in the windows selected. In that case, we can use the concept of ITT to obtain the lower bound of the preschool effect on our outcomes of interest (McCoy, 2017). Applying the ITT allows us to improve our estimate over other methods like the ordinary least squares (OLS). Therefore, our estimates become relevant to policymakers because they provide the first evidence of preschool on the active role of the children in the household.

#### **4 Main results**

Identification of the ITT depends on the window selected. Thus, we start this section by showing the procedure for choosing the optimal window. It means choosing the window based on covariate balance; thus, the local randomization assumption is plausible. Therefore, we apply the data-driven procedure developed by Cattaneo et al. (2015) over the entire support of our score variable. In our analysis, the largest

window is  $[-90, 275]$ , and the minimum window is  $[-6, 6]$ . We set this minimum window to ensure at least ten observations at either side of the cutoff, as Cattaneo et al. (2015) recommended.

We run the balance test on covariates on different windows using the Kolmogorov-Smirnov (KS) statistic. After that, we select the minimum  $p$ -value across all tests in each window and plot it in Figure 2. The horizontal line in Figure 2 represents a significance level of 0.15. We choose this significance level because, in this paper, we are concerned with type II error - failing to reject the null hypothesis when it is false (Cattaneo et al., 2015). Figure 2 shows that the local randomization assumption holds in windows lower than 14. Therefore, we choose the windows  $[-11.00: 11.00]$ , vertical line, because the minimum  $p$ -value exceeds 15% in this window.



Note: The horizontal dotted line correspond to  $p$ -value = 0.15 and the vertical dotted line correspond to the window  $[-11.00: 11.00]$

Figure 2: Window selector based on covariates

Table 2 allows us to understand Figure 2 because this table shows the covariates with a minimum  $p$ -value for the first ten windows. Table 2 shows that window  $[-9.00: 9.00]$  is optimal because it has a minimum  $p$ -value equal to 0.265. In this window, we have 60 observations; 30 should be in the treatment group and 30 in the control group. The selection procedure based on the balance test suggests that these observations are statistically identical and thus may be treated as if randomly assigned. The difference in optimal window size between the graphical analysis and Table analyses is due to the statistic test used. While in figure 2, we use the KS test, in Table 2, we use the difference in means test. Therefore, by being cautious, we make our inferences about the preschool effect using the following window:  $[-11.00: 11.00]$ ,  $[-10.00: 10.00]$ , and  $[-9.00: 9.00]$ .

Table 2: Window selector based on covariates: randomization-based p-values from balance tests for different windows.

Window size	Minimum p-value	Covariate with a minimum p-value
[-7.00: 7.00]	0.168	Available per capita income
[-8.00: 8.00]	0.217	Available per capita income
[-9.00: 9.00]	0.265	Available per capita income
[-10.0: 10.0]	0.152	Father's schooling
[-11.0: 11.0]	0.161	Years of study
[-12.0: 12.0]	0.074	Years of study
[-13.0: 13.0]	0.060	Years of study
[-14.0: 14.0]	0.065	Years of study
[-15.0: 15.0]	0.027	Years of study

Note: covariates used in balance test: region; gender; age; mother's schooling; father's schooling; family size; years of study; available per capita income.

The main results of this paper are presented throughout the remainder of this section. First, we must recall that *bargaining1* is the ratio between the expenditure on products of interest to children and the family income. Meanwhile, *bargaining2* is the ratio between the expenditure on products of interest to children and the available per capita income. Consequently, we expect that the coefficient of interest will always be higher for the *bargaining2*.

Table 3 shows that preschool attendance positively and significantly affects the children's bargaining power in the family decision-making regarding purchasing products of interest to them. The effect remains stable in the three windows used. Concerning the *bargainng1* variable, we note that the child who attended preschool increases the influence in family decision-making by approximately 0.22 S.D<sup>5</sup>. When we look at the *bargaining2* variable, we observe that the preschool's effect is 0.29 S.D<sup>6</sup>. These results bring the first evidence that children have an active role in how the family's expenditures are done.

Table 3: Intention-to-treat of preschool on bargaining power on the household decision in 2017/2018

	Randomization-based approach		
	<i>Bargaining1</i>		
Preschool (ITT)	0.008	0.008	0.007
p-value	<b>0.025</b>	<b>0.063</b>	<b>0.071</b>
Window	[-11.00: 11.00]	[-10.00: 10.00]	[-9.00: 9.00]
Sample size treated	37	35	30
Sample size control	36	33	30
	<i>Bargainning2</i>		
Preschool (ITT)	0.037	0.039	0.040
p-value	<b>0.031</b>	<b>0.078</b>	<b>0.085</b>
Window	[-11.00: 11.00]	[-10.00: 10.00]	[-9.00: 9.00]
Sample size treated	37	35	30
Sample size control	36	33	30

Note: Results based on fixed-margins randomization mechanism. The treatment effect is obtained using the difference-in-means test statistic. All p-values less than or equal to 0.10 are bold.

Table 3 supports the argument that preschool may be important in producing and improving the necessary skills to enable the negotiation process between parents and children. The preschool creates the foundation that enhances and improves the accumulation of cognitive and noncognitive skills (Cunha et al.,

<sup>5</sup> The standar deviation of bargaining1 on the technology category is 0.036

<sup>6</sup> The standar deviation of bargaining1 on the technology category is 0.138

2010; Heckman et al., 2013; Heckman, 2008). Thus, preschool attendance impacts the bargaining power through the effect called skills begets skills (Cunha & Heckman, 2007; Heckman, 2008). Given that both groups of children have the same years of education, the preschool makes it easier to acquire skills and increases the efficiency of later investments in education such as primary school.

So far, the results show that a higher level of human capital affects children's bargaining power in the household. To further our analyses, we investigate whether the children's bargaining power varies according to the type of products of interest for them. Table 4 presents the estimates for *bargaining1* and *bargaining2* stratified by the following categories: leisure, toys, and technology-related items. Note that the preschool does not affect children's bargaining power on purchasing leisure items [Appendix A III. lists all products included in each category]. The non-significance may be attributed to the fact that the average individual's expenditure on the consumption of leisure items is low, as we can see in Table 1. The low average amount spent on leisure items can be explained by how the data is collected and the frequency with which these goods are consumed. For example, the data on the consumption of these items refer to the last 30 days before the time the POF questionnaire was applied, and these items are not consumed every month.

Table 4: Intention-to-treat of preschool on bargaining power on the household decision in 2017/2018 stratified by three product categories.

	Leisure		Toys		Technology-related items	
	<i>Bargaining</i> <i>1</i>	<i>Bargaining</i> <i>2</i>	<i>Bargaining</i> <i>1</i>	<i>Bargaining</i> <i>2</i>	<i>Bargaining</i> <i>1</i>	<i>Bargaining</i> <i>2</i>
Preschool (ITT)	0.001	0.002	0.001	0.003	0.006	0.032
p-value	0.243	0.232	0.755	0.694	<b>0.072</b>	<b>0.072</b>
Window	[-11.00: 11.00]		[-11.00: 11.00]		[-11.00: 11.00]	
Sample size treated	37		37		37	
Sample size control	36		36		36	

Note: Results based on fixed-margins randomization mechanism. The treatment effect is obtained using the difference-in-means test statistic. All *p*-values less than or equal to 0.10 are bold.

In Table 4, we also observe that the preschool variable does not impact children's bargaining power over toy consumption. The characteristic of our sample explains this null effect on the toy category because our sample has information about children older than ten years old. According to SPC (2015), toys are products of interest for younger children. Therefore, given our sample, the results were expected.

The children's bargaining power over purchasing technology-related items provides us with helpful information. This information confirms the mechanism of how preschool affects family decision-making processes. Table 4 reveals that children who attended the preschool increased their bargaining power by 0.17 S.D<sup>7</sup> and 0.25 S.D<sup>8</sup> over consumption of products listed in the technology category. This significant effect captures the ability to acquire higher levels of human capital due to having attended preschool. We infer that children exposed to preschool use more enhanced bargaining strategies to affect purchasing technology items in the household.

<sup>7</sup>The standar deviation of bargaining1 on the technology category is 0.035

<sup>8</sup> The standar deviation of bargaining2 on the technology category is 0.13

The results observed in the technology categories are expected. Children older than ten years and adolescents may have more access to product information and a greater understanding of the economic concept (Strauss, 1952). For instance, adolescents may be aware of the possibility of buying using a credit card. Thus, the information about the products and the human capital acquired allows children to increase their influence on purchasing the technology items in the household.

#### 4.1 Sensitivity test.

In this subsection, we present the sensitivity tests to improve our estimates. First, we run the randomization-based analysis for four different windows. Second, we change the randomization mechanism and analyze the preschool effect on the windows selected above.

Table 5 shows the estimates for four different windows. We consider the following windows to run the sensibility test: [-12.00; 12.00], [-13.00; 13.00], [-14.00; 14.00], and [-34.00; 34.00]. As for the latter, we use this window because it is the optimal bandwidth in the standard RDD approach. The other three windows are larger than those presented in the previous subsection, and they still satisfy assumption 1 according to the KS test presented in Figure 2.

The results from table 5 show that the ITT of the preschool is stable in windows less than or equal to [-14.00; 14.00]. For these windows, the coefficients are stable in both bargaining measures. However, we observe changes in our estimates when we use the bandwidth size from standard RDD. For example, the coefficient is not significantly different from zero, and its signal is unexpected. The estimates in the window [-34.00; 34.00] do not weaken our analysis because assumption 1 is not satisfied in this window. It means that we do not compare statistically equal individuals under the randomization-based RDD approach.

Table 5: Sensitivity of randomization-based RDD results: preschool effects for different windows choices.

Randomization-based approach				
		<i>Bargaining1</i>		
Preschool (ITT)	0.007	0.007	0.007	-0.003
p-value	<b>0.053</b>	<b>0.022</b>	<b>0.019</b>	0.650
Window	[12.00]	[13.00]	[14.00]	[34.00]
Sample size treated	40	42	45	123
Sample size control	37	41	44	91
		<i>Bargaining2</i>		
Preschool (ITT)	0.034	0.033	0.033	-0.003
p-value	<b>0.075</b>	<b>0.035</b>	<b>0.024</b>	0.858
Window	[12.00]	[13.00]	[14.00]	[34.00]
Sample size treated	40	42	45	123
Sample size control	37	41	44	91

Note: Results based on fixed-margins randomization mechanism. The treatment effect is obtained using the difference-in-means test statistic. All  $p$ -values less than or equal to 0.10 are bold.

We also present the estimates for the selected windows using the Bernoulli randomization mechanism. Table 6 shows that even changing the randomization mechanism, the coefficients remain the same as in Table 3. As seen in the last column of Table 6, when we change the randomization mechanism, the ITT becomes not statistically significant. However, the randomization mechanism switch does not affect our inferences considerably because it does not generate a significant change in the  $p$ -value.

Table 6: Sensitivity of randomization-based RDD results: preschool effects for Bernoulli randomization mechanism.

Randomization-based approach			
		<i>Bargaining1</i>	
Preschool (ITT)	0.008	0.008	0.007
p-value	<b>0.041</b>	<b>0.068</b>	0.103
Window	[-11.00: 11.00]	[-10.00: 10.00]	[-9.00: 9.00]
Sample size treated	37	35	30
Sample size control	36	33	30
		<i>Bargaining2</i>	
Preschool (ITT)	0.037	0.039	0.040
p-value	<b>0.072</b>	<b>0.098</b>	0.132
Window	[-11.00: 11.00]	[-10.00: 10.00]	[-9.00: 9.00]
Sample size treated	37	35	30
Sample size control	36	33	30

Note: Results based on the Bernoulli randomization mechanism. The treatment effect is obtained using the difference-in-means test statistic. All  $p$ -values less than or equal to 0.10 are bold.

All in all, our sensitivity analysis support that the preschool ITT results are robust. Nevertheless, of course, these results need to be used cautiously. Albeit incipiently, these results indicate that preschool affects the children's role in the household. Our estimates show that investments that improve the children's human capital, such as preschool, may affect the children's bargaining power in the family decision-making process. Therefore, does not include children in the analysis of the household decision-making process generates biased estimates, as stated by Dauphin et al. (2011).

## 5 Final Remarks

Being exposed to any interventions during early childhood produces several positive effects on an individual's outcomes. These effects are observed on academic performance, future wage, labor productivity, and health conditions. However, since preschool affects the process of human capital accumulation, it can also affect children's role in intra-household relationships. Although the preschool's effect can be found in several dimensions of household relations, this paper focused on analyzing the preschool effect on family consumption decision-making. Thus, we sought to identify the intention-to-treat (ITT) of the preschool on the children's bargaining power in purchasing products of interest to them.

To identify the ITT of the preschool on children's bargaining power, we drew our analysis sample from the POF 2017-2018. We used information about children's birth dates, their consumption of products of interest to them, family income, and other household socioeconomic characteristics from this database. Due to the characteristics of the data, the identification strategy that we used was a randomization-based RDD approach. Our strategy's central assumption makes the preschool frequency determination close to a random experiment, allowing the ITT concept to be applied in our setting.

The analysis developed here yields exciting results. They show the novel dimension of the preschool effects. We found evidence that the preschool frequency may affect the children's bargaining power in family decision-making. Children who attend preschool have greater bargaining power over the decision-making in purchasing products of interest to them, especially technology items such as cell phones. These results lead us to infer that the accumulation of human capital enhanced by preschool provides the children with different strategic approaches to achieve their goals regarding the consumption of goods.

Our paper underlines the effectiveness of preschool on family decision-making, even if only incipiently. The characteristics in our analysis do not allow us to identify a causal relationship; therefore, we need to be cautious when using the results because the ITT shows the minimum preschool's effect on our relationship of interest. However, our findings indicate that children play an active role in household decision-making. This role can be enhanced by investment in human capital in early childhood. Thus,

policies directed at financial education or consumer awareness may be more effective when directed at children. Furthermore, we corroborated that children should indeed be considered in household demand analysis, especially if they are teenagers.

The main limitation of this paper was the data availability. Without longitudinal data on the individuals of interest, we resort to identifying the ITT estimator. In addition, the scarcity of data did not allow for performing a heterogeneous effects study considering the location of the households, rural or urban.

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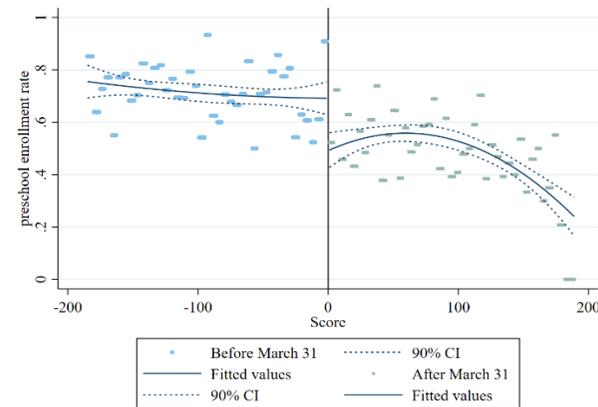
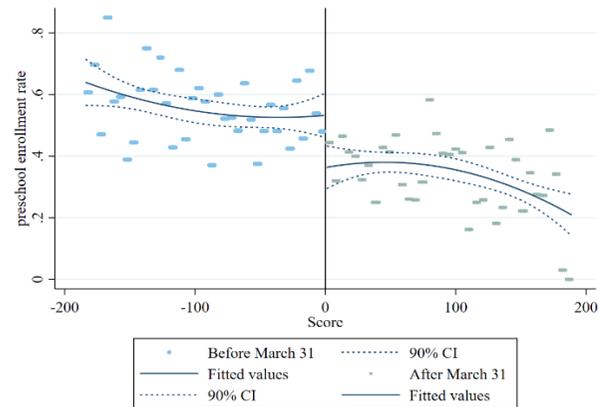
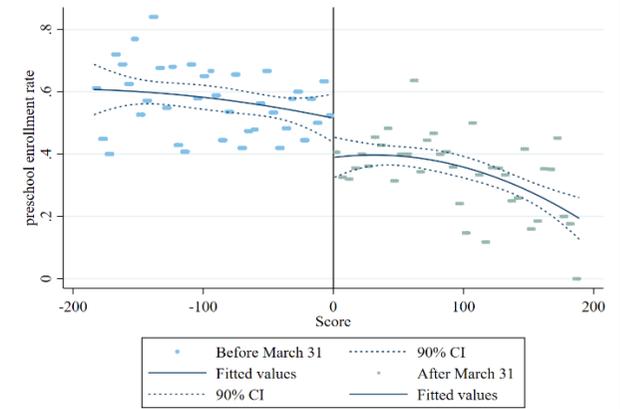
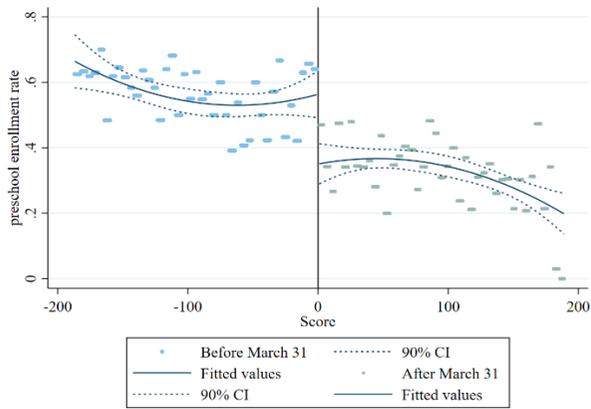
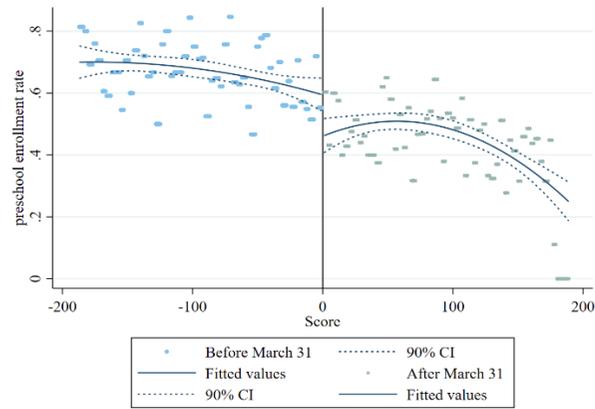
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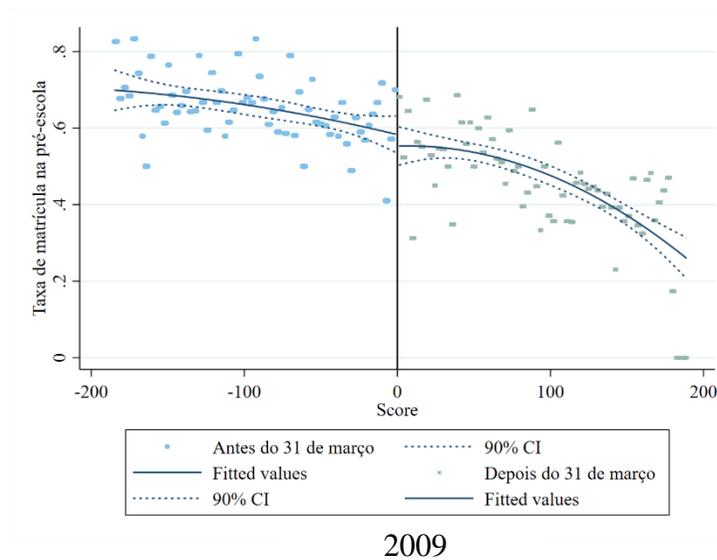
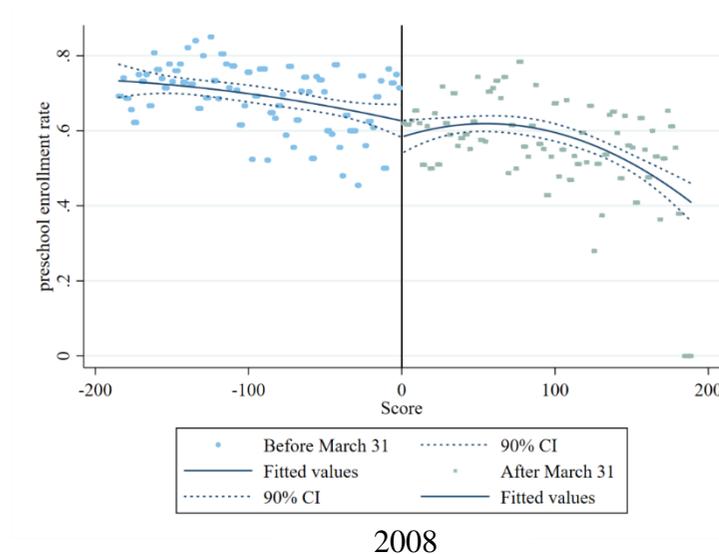
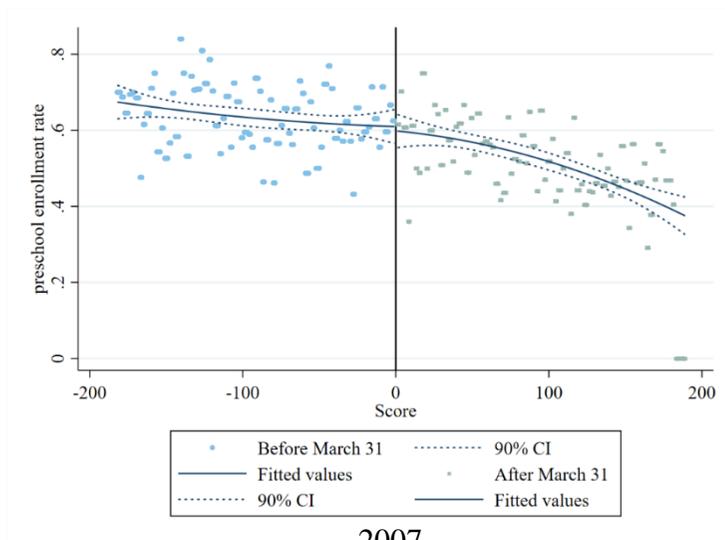
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## SUPPLEMENTAL APPENDIX

### A I: Effect of date birth on preschool enrollment after 2009



## A II: Effect of date birth on preschool enrollment before 2010



**A III: List of the products used to define the consumption of the individuals of interest**

Category	POF Table	Description
Leisure items	28	Cinema (tickets) Circus (tickets) Amusement park (tickets) Shows (tickets) Parties (tickets) Soccer (tickets) Volleyball (tickets) F1 (tickets) Eletronic games (token) Video game (token) Eletronic games (internet) CD, DVD, or Game Cartridge Game CD Game DVD Game cartridge CD, DVD, or Game Cartridge rental Game CD rental Game DVD rental Game cartridge rental Playstation NOW Steam Gameflix Netflix game Nintendo Twitch
Toys	43	All items listed in table 43 were included
Technology items	44	Cell phone Mobile phone applications Mobile phone accessories Mobile phone case Snap projector

Source: IBGE (2020)